Distribution and abundance of the Chatham Island Oystercatcher (*Haematopus chathamensis*)

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ABSTRACT

From 13 to 18 December 1998, we counted Chatham Island Oystercatchers (*Haematopus chathamensis*) on approximately 310 km (96 - 97%) of the coastlines of Chatham, Pitt, Rangatira, and Mangere Islands, and 100 km (100%) of the shore of Te Whanga Lagoon, Chatham Island. A total of 142 adult Chatham Island Oystercatchers, including 34 confirmed breeding pairs and seven additional possible breeding pairs, was found. This is an increase of 20 to 40 adults over any previous count or estimate. Some of this increase may be due to efforts by the Department of Conservation to increase productivity of breeding pairs since the early 1990s along the northern coast of Chatham Island. Approximately 70% percent of the breeding pairs were on Chatham Island, 15% on Pitt Island, 10% on Rangatira and 5% on Mangere Island. Most of the oystercatchers (79% of individuals and 74% of the breeding pairs) were in areas we broadly defined as containing rocky wave-cut platform or other rocky coastline or outcrops. Thirty individuals and nine breeding pairs were on sandy beaches. One immature bird was on the shore of Te Whanga Lagoon.

KEYWORDS: Chatham Island Oystercatcher, *Haematopus chathamensis*, Chatham Islands, population size, endangered species.

INTRODUCTION

The Chatham Island Oystercatcher (*Haematopus chathamensis*) is an endangered species endemic to the Chatham Islands (Baker 1973, Davis 1988, Collar *et al.* 1994, Department of Conservation 1994). Counts from 1986 to 1996 estimated the population to be between 65 and 120 adults, including 30 - 44 pairs (Best 1987, Davis 1988, Davis 1989, Page 1992, Sawyer 1993, 1994; F. Schmechel, unpubl. data). Because only one or two people conducted these counts, they were done over limited areas and/or over relatively long periods (6 - 13 weeks) thus increasing the likelihood of undercounting or double-counting birds. The 1998 census is the first to be conducted within a relatively short time-frame (1 week) over all four islands where Chatham Island Oystercatchers breed.

Chatham Island Oystercatchers are non-migratory, and almost strictly coastal in their distribution (Baker 1973, Davis 1988). Breeding pairs appear to be fairly sedentary and defend their territories strongly during the breeding season, although individuals may move to other areas to feed (Davis 1988). As with many other oystercatcher species, they do not breed until at least two or three years old (Davis

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1988, Marchant & Higgins 1993, Hockey 1996). Occasionally pairs defend territories but do not breed (Davis 1988); these pairs usually breed the following season (Sawyer 1983, 1984; F. Schmechel, unpubl. data). Territorial and breeding pairs often respond to a cardboard model of an oystercatcher placed inside the boundaries of their territories, displaying the same aggressive behaviours they do towards an intruding floater or neighbouring pair of oystercatchers (e.g., piping displays, object tossing, physical attacks) (F. Schmechel, unpubl. data). Non-breeding and immature birds do not defend territories during the breeding season and 'float' around, moving from area to area, even island to island, occasionally forming small flocks of up to a dozen birds (Davis 1988; S. Sawyer, pers. comm.; F. Schmechel, unpubl. data). Floaters may form pairs, which forage, roost and travel together.

METHODS & LOCATION

Census

We searched the coastline of four islands (Chatham, Pitt, Rangatira and Mangere) inhabited by Chatham Island Oystercatchers (Fig. 1) from 13 to 18 December 1998. This is within the breeding season, when all pairs are defending territories along the coast. We attempted to cover the islands in as short a time as possible to minimise the chance of mis-counting birds.

Census team members collected data on numbers of birds, band combinations, location, age class, habitat type, and made notes on breeding status and behaviour. The presence of nests or chicks was noted, but is not reported in this paper. Age class was estimated by colour of eyes, bill, and legs, i.e., oystercatchers with orange bill tip (possibly brown in some individuals), brown-orange eyes (versus scarlet) and pale legs were classified as immature birds; those with scarlet red/orange eyes, no brown on the bill tip, and reddish-pink legs as adults (Marchant & Higgins 1993, Heather & Robertson 1996; F. Schmechel, unpubl. data). Colours can be difficult to distinguish from a distance and ageing birds becomes progressively more difficult as they approach adulthood. When in doubt, we assigned birds to the general category of adult. A cardboard model of an oystercatcher was sometimes used to determine territoriality of pairs if breeding could not be confirmed.

Department of Conservation staff and contractors, members of the Ornithological Society of New Zealand, the 'Taiko Team', and volunteers from the local community (a total of 35 people) participated in the census. We explained identification, ageing criteria, behaviours, and data recording to the team before the census and some of the less experienced members were teamed up with more experienced people. However, some areas of the coastline and lagoon edge were surveyed by trained but inexperienced observers.

Team members checked the majority of the coast and lagoon edge on foot. Some long stretches of beach and the northern edge of Te Whanga Lagoon were surveyed from four-wheel farm bikes, and a section of the southern cliffs of Chatham Island between Cape Fournier and Otawae Point, where land access is difficult, was searched from a boat running close to the shore (Fig. 2). The swell was too

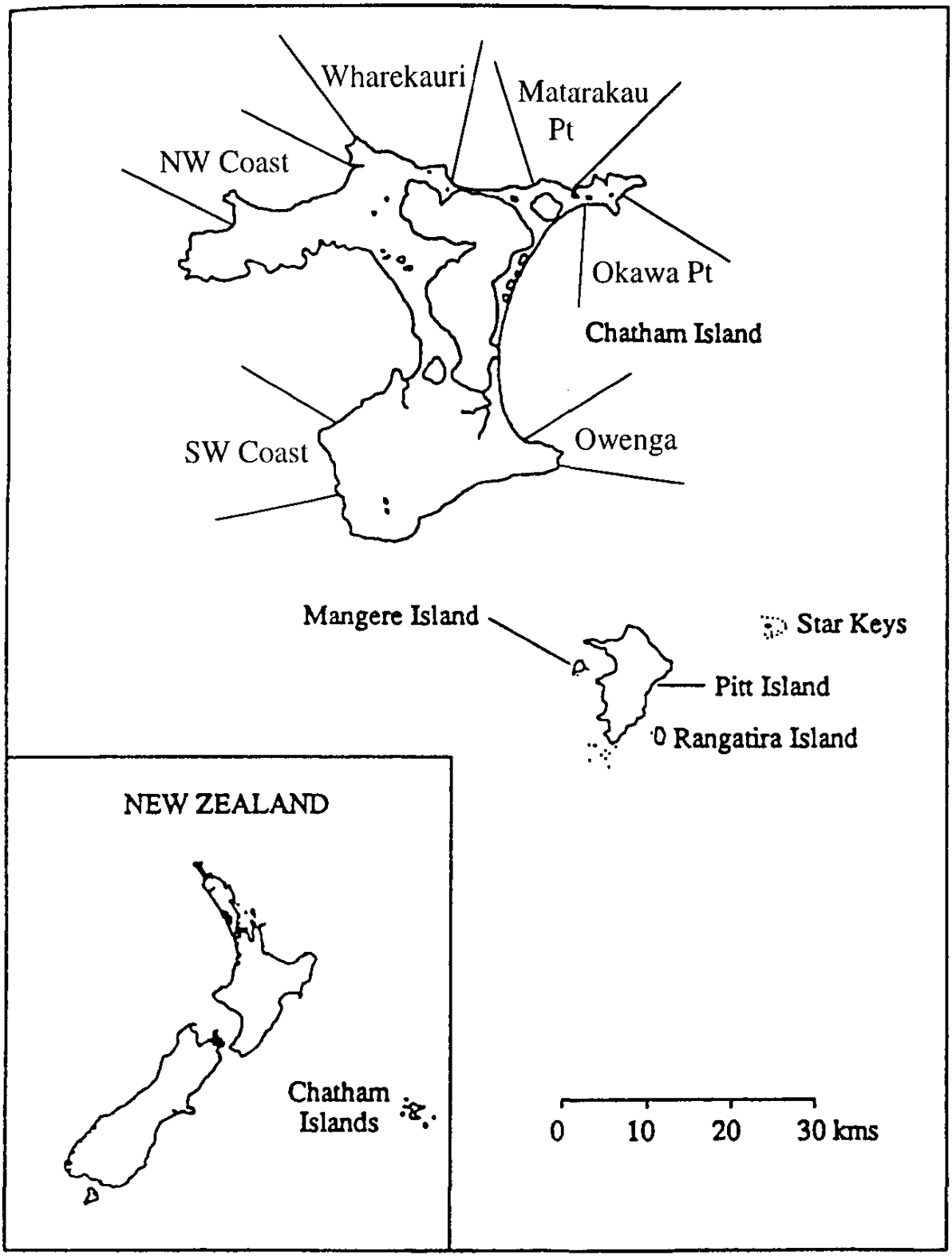

FIGURE 1 – Map of the Chatham Islands and the areas used for comparison with past counts (Table 2).

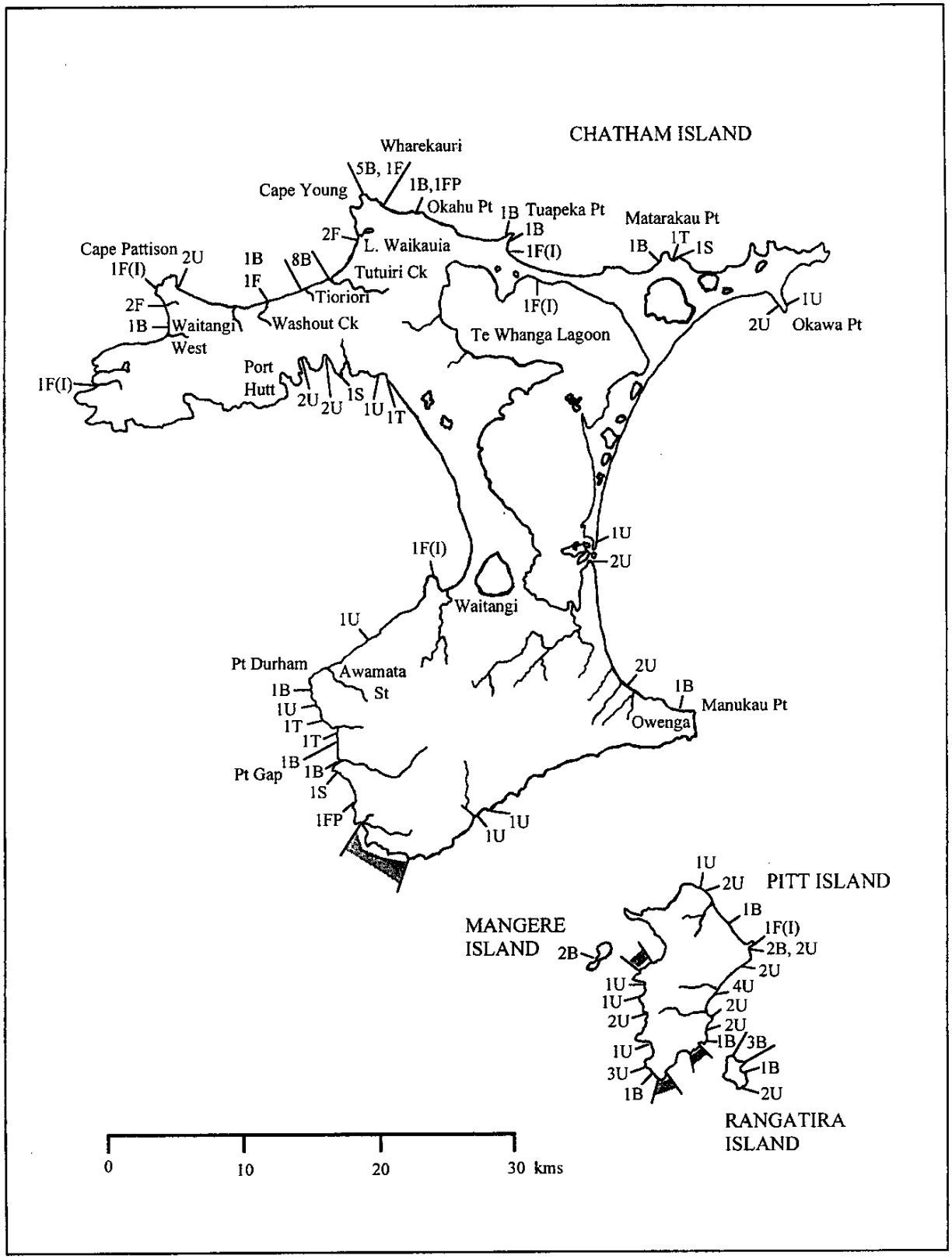

FIGURE 2 - Location and numbers of oystercatchers sighted during the 1998 census and the areas not covered by the 1998 census (stippled). Codes: B = confirmed breeding pair, S - suspected breeding pair, T - territorial pair, FP - floating pair, F - floater, I - immature, U - status unknown.

large to complete a section of coastline of about eight kilometres between Otawae Point and an unnamed point east of Green Point, and the team did not cover a few small sections of the Pitt Island coastline (approximately four kilometres) (Fig. 2). Altogether, we checked an estimated 310 km of coastline, about 96 - 97% of the total coastline, and 100 km of lagoon edge (100%). This survey covered the known range of the Chatham Island Oystercatcher except for the Star Keys (small rock outcrops about 10 km east of Pitt Island) and the Muramura stacks off southern Pitt Island, where one or two oystercatchers have been reported (Davis 1988; M. Bell, pers. comm.; S. Sawyer, pers. comm.).

Mapping and analysis

For the purposes of data analysis, we assigned oystercatchers to one of the following categories:

1) *confirmed breeding pair* - breeding confirmed for that season by sighting of either a nest or chick;

2) *suspected breeding pair* - pair not confirmed as territorial, but they are either displaying breeding behaviours (e.g., alarm calls, distraction displays) however nest or chicks were not found, or have been reported breeding from earlier in the season (but reports are unconfirmed);

3) *territorial pair* (a good predictor of breeding in either the current or next breeding season) - pair seen to defend territory against either floaters, other pairs, or a model oystercatcher but not confirmed to be breeding;

4) *floaters* - singles, or pairs travelling around together but not displaying territorial or breeding behaviours; and

5) *breeding status unknown.*

Where observers noted two adults together but had no additional information on their status, we recorded them as two individuals of unknown status at the same location, rather than as a 'pair'. We used this approach to avoid calling floaters 'pairs', since the term 'pair' can lead to an assumption of more breeding pairs than actually exist. This is a conservative approach and may underestimate the number of breeding pairs in areas seldom checked. In this paper the general term breeding pair includes confirmed and suspected breeding pairs, and territorial pairs.

RESULTS & DISCUSSION

Distribution and abundance

We counted a total of 142 adults (including those with immature colouration) on the four islands, including 34 confirmed breeding pairs and seven additional possible breeding pairs (Fig. 2). Together, Chatham and Pitt Islands (96% of the area searched) accounted for 90% of the total number of adults seen and about 85% of the breeding pairs (Table 1). Per unit area of coastline, Rangatira Island had the highest density of individual birds and breeding pairs (Table 1). The number of

TABLE 1 - Number (and percentages) of Chatham Island Oystercatchers seen on each island in the Chathams, December 1998. Individual oystercatchers includes both adults and those with immature plumage. Lower estimates of breeding pairs are confirmed breeding pairs only, upper estimates includes suspected breeding pairs and territorial pairs.

Location	Total individual oystercatchers			Number of breeding pairs		
	No.	(%)	per 10 km of coastline*	No.	(%)	per 10 km of coastline*
Chatham	94	(66)	4	23 - 30	(67 - 73)	1
Pitt	34	(24)	6	5	(15)	1
Rangatira	10	(7)	12	4	(12)	5
Mangere	4	(3)	6	2	(6)	3
Total	142			34 - 41		

* rounded to the nearest whole number

breeding pairs on Pitt Island may be an underestimate because many were observed infrequently and/or from a long distance, making determination of breeding status difficult.

Six (4%) of the oystercatchers seen had immature colouration, the remainder had adult or undetermined colouration. The number of birds with immature colouration will be a minimum, as those viewed from a distance, or where the observer was uncertain, were assigned to the adult age class.

Fifty-one birds had metal bands, 49 were unbanded, 29 unknown (e.g., legs not seen), and 13 had either colour bands or jesses. None of the individually recognisable birds was sighted twice, but there were two cases when birds not originally seen were sighted later (M. Bell, pers. comm.). Individuals (especially floaters) can move considerable distances from month to month, even between islands (Davis 1988; F. Schmechel, unpubl. data), but details of how often birds move around and the patterns of movement are unknown. With only a small proportion of birds individually identifiable, it is difficult to estimate the likelihood of birds having been double counted or missed in this census. We attempted to minimize mis-counting by checking adjacent survey areas on the same day as much as possible.

Population trends

Thirty-nine more adult Chatham Island Oystercatchers were seen during the 1998 census than in any previous count, and the total was 22 more than the highest previous estimate (Table 2). Many past surveys were only partial (e.g., 1970/71, 1986/87, 1995/96) and covered different areas from one another. However, if a comparison is made of the number of adult oystercatchers seen in areas that have been counted most consistently over the last 12 years, it shows that numbers have increased in the northern half of Chatham Island, have remained steady in the southern half of Chatham Island and on Pitt Island, and decreased on Rangatira Island (Table 2). There is also good evidence that the number of breeding pairs

TABLE 2 - Numbers of adult Chatham Island Oystercatchers in selected areas over 12 years of surveys (including those with immature plumage for 1998). Numbers in parentheses indicate that only a portion of the area was surveyed. Areas (see also Fig. 1): NW Coast - Waitangi West to Waikauia Lake mouth, Wharekauri - Cape Young to Taupeka Point, SW Coast - Awamata Stream to Point Gap. Sources: 1970/71 = Baker (1973), 1986/87 = Best (1987), 1987 = Davis (1988), 1992 = Page (1992), 1995/96 = F. Schmechel (unpubl. data).

Areas	1970/71[1]	1986/87[1]	1987	1992	1995/96[1]	1998
NW Coast	4 - 20	n/a	14	14	22	28
Wharekauri	6 - 30	10	16	11 - 12[2]	12	19
Matarakau Point	0	0	0	2	4	6
Okawa Point	0	0	0	0	3	3
Owenga	2 - 10	2	3	1	5	4
SW Coast	0	12	11	2 - 6	9	13
Pitt Island	8 - 40	(8)	32	9	(10)	34
Rangatira	11 - 50	n/a	17	12	12	10
All other areas	4 - 20	15	13	18	20	24
TOTAL count	25+	65	103	69	97	142
TOTAL estimate	50	65 - 75	103 - 110	69 - 73	100 -120	140 - 150

[1] partial surveys only
[2] upper range includes 'unconfirmed sightings'

has increased on the north coast of Chatham Island since 1987, but decreased on Rangatira Island since the 1970s (Table 3).

Increases in the numbers of birds observed on the northern coast may be due, at least in part, to management activities since the early 1990s by the Department of Conservation designed to increase the productivity of breeding pairs, especially between Waitangi West and Okahu Point. Changes in weather patterns that effect the direction of high winds and storm tides during the breeding season could also have a significant effect on productivity over time in particular areas (Lauro & Nol 1993). The decline of breeding pairs on Rangatira since the mid 1980s is difficult to explain and could be due to a variety of causes including changes in habitat, weather patterns, lack of local recruitment, Brown Skua (*Catharacta skua*) numbers, disturbance factors, or a combination of these or other factors.

Variables and potential biases

There are potential biases in the data from both this census and previous counts. The time of day, tide, weather, and observer's skill, knowledge and experience may bias the number of birds sighted (Bibby *et al.* 1992). The weather during this census was mixed with light or no winds (less than 40 km/h) on most days and stronger winds (estimated 40 to 60 km/h) on two other days. Light rain delayed the start times on two days (14 and 15 December), but there was no precipitation during the remainder of these days. Only one section of coast was checked during occasional showers on the morning of 15 December. Most days were a mix of cloud and sun, except 16 and 17 December, which were fine.

TABLE 3 - Changes in the number of 'pairs' of Chatham Island Oystercatcher along the north coast of Chatham Island (Washout Creek to the east end of Tioriori beach and Cape Young to Okahu Point) and Rangatira Island. The term 'pair' may have not been defined in the source documents and could include floating (i.e. non-breeding) pairs. Sources: a = Fleming (1939), b = *in* Davis (1988), c = Davis (1988), d = Page (1992), e = Sawyer (1993), f = Nilson *et. al.* (1994), g = Sawyer (1994), h = F. Schmechel, unpubl. data, i = 1998 census.

	North coast of Chatham Island		Rangatira Island		
Year	Total pairs[1]	Known breeding	Total pairs[1]	Known breeding	Source
1937			3		a
1970-84			10 - 13[2]		b
1984-87			9		b
1987/88	11		8		c
1991/92	11		6		d
1992/93	13	10	6		e,f
1993/94	13	9	6		g,f
1994/95	13	11			h
1995/96	14	14	6		h
1996/97	14	14			h
1998/99	15	15	5	4	i

[1]includes territorial, known and suspected breeding pairs
[2]except in 1978/79 when only 9 pairs were recorded (H. Robertson, pers. comm.)

High tide peaked between 02:52 - 06:34 and 15:17 - 18:54 during the dates of the census. The majority of the survey work was carried out between 09:00 - 18:00 resulting in portions of the rocky coastline being checked around low tide when birds may be more difficult to observe because they are foraging on rock platforms out of sight.

Travelling slowly on foot may increase the chances of observing and hearing birds compared with travelling by farm-bike or boat, particularly along locations with rocky coastline. The majority of rocky coastline was checked by foot during this census; however, if farm-bike or boats were used more extensively during any of the past surveys, it may explain some of the variation in numbers between years (e.g., 1992).

The overall potential bias for this census may be towards a slight undercounting of birds due to: the likelihood of missing birds on rocky coastline during low tide, effects of winds and swell on detecting birds (especially the south coast), areas of coastline that were not checked and may have contained birds, and the use of inexperienced observers in some areas. Countering this bias is the possibility of double-counting birds, especially since few have unique band combinations. As a result of this a range of 140 - 150 has been estimated for the population (Table 2).

Differences in methods between counts over time (e.g., the amount and areas of coast-line and lagoon edge covered, the number of days over which the count was conducted, the experience of the observers, the definition of pairs, the method of travel) increase the risk of bias and make trends in numbers of breeding pairs, floaters, and the total population difficult to detect (Table 4). This census and the

TABLE 4 - Comparison of time-frames, and number and experience of participants for past survey efforts. Experience of observers: H = high, U = unknown, M = mixed. Sources: a = Best (1987), b = Davis (1988), c = Page (1992), d = F. Schmechel, unpubl. data, e = 1998 census.

Survey dates	Duration (weeks)*	Number of participants	Approx. percent of coastline surveyed	Experience of observers	Source
22.12.86 - 2.2.87	6	1	30	H	a
12.10.87 - 5.12.87	8	1	95	H	b
9.1.92 - 20.2.92	7	2	100	U	c
11.11.95 - 11.2.96	13	4	75	H	d
13.12.98 - 18.12.98	1	35	98	M	e

* rounded off to the nearest week

1987 surveys are probably the most comparable in terms of methods of travel, experience of observers, and areas covered. Many of the other surveys may have underestimated total numbers of birds in at least portions of their range due to incomplete coverage of areas (1970/71, 1986/87, 1995/96), or lack of experienced observers and/or methods of travel used (1992). In spite of this, the magnitude of the changes on the northern coast of Chatham Island and Rangatira are too large to be explained by variations in survey intensity alone, especially for breeding pairs, which tend to be reasonably sedentary and may be checked several times per season.

Habitat use

All oystercatchers were seen along the seacoast (e.g., within 0.5 km of the ocean) apart from one apparently immature bird that was seen on Te Whanga Lagoon on a substrate of sand and mud with low vegetation. Thirty adults (21% of the total), including nine breeding pairs (26%), were on sandy (or sand and shell) beaches. Many of the sandy areas used by oystercatchers were near stream mouths, and had wide beaches and abundant kelp deposits. All other sightings (79%) were in areas broadly defined as having some wave-cut rock platform (relatively flat volcanic or sandstone platforms exposed only during low tide) or intertidal rocky areas (volcanic, schist or sandstone) associated with them (see also Davis 1988 for descriptions and maps of habitat types). Approximately 40% of the coastline of the four islands surveyed is classified by Davis (1988) as some type of intertidal rocky platform, 35% as sandy beach, and 25% as cliff or boulder. The oystercatchers are selecting intertidal rocky habitats (79% use / 40% availability), using sandy beaches less than would be expected based on availability (21% use / 35% availability), and avoiding cliff and boulder areas (0% use / 25% availability).

CONCLUSIONS

The 1998 census was the most intensive to date, providing a base-line from which to compare both past and future Chatham Island Oystercatcher counts. Variations in census effort, methods, timing, and data collected between counts make it difficult to determine how much of the increase in numbers recorded is the result of actual changes in the population, changes in the census effort and accuracy, changes in management, or a combination of these and/or other factors. However, the estimated increase in total numbers (20 - 100% over previous estimates) and the nature of the data for some areas (e.g., the northern coast of Chatham and Rangatira Islands) provide good evidence that changes have occurred in the numbers of Chatham Island Oystercatchers and are not just the result of increased census effort.

Careful and intensive monitoring is essential to detect changes in numbers, especially if numbers begin to decline. Because Chatham Island Oystercatchers, like other oystercatchers, appear to be long-lived, do not begin breeding until at least two or three years old, and a proportion of the Chatham Island Oystercatcher population is non-territorial, it would be easy to miss early changes, such as a decline in the floater population, if periodic, comparable censuses were not conducted. Undetected declines in portions of the population, or concluding the population is increasing when it is not (a Type II error), could have serious implications for the conservation and management of the species if undetected for too long.

Future surveys should be designed to minimise potential biases and make those counts as comparable as possible with this census. If partial surveys are done between complete censuses, the same areas should be covered each time and standard methods used. If birds are individually marked, future counts could also provide information on adult and fledgling survival, movements, fidelity, population structure, and fecundity. Future surveys, combined with individual colour-banding, could also reveal whether management on the northern coast is benefiting the species at other sites.

The number of Chatham Island Oystercatchers appears to have increased significantly. However, because reliable comparisons with past estimates cannot be made, trends in the overall population will remain uncertain until further comparable counts are undertaken.

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